DOCUMENT RESUME

ED 253 851 CS 007 927

AUTHOR Pearson, P. David
TITLE The Comprehension Revolution: A Twenty-Year History of Process and Practice Related to Reading Comprehension. Reading Education Report No. 57.
INSTITUTION Bolt, Beranek and Newman, Inc., Cambridge, Mass.; Illinois Univ., Urbana. Center for the Study of Reading.
SPONS AGENCY National Inst. of Education (ED), Washington, DC.
PUB DATE Feb 85
CONTRACT 400-81-0030
NOTE 59p.; Commentary by Bertram Bruce.
PUB TYPE Information Analyses (070)

EDRS PRICE MF01/PC03 Plus Postage.
DESCRIPTORS *Educational Change; *Educational History; Elementary Secondary Education; *Reading Comprehension; *Reading Instruction; *Reading Processes; *Reading Research; Research Needs; State of the Art Reviews

ABSTRACT

Through reflections upon the ideas and events that have shaped current views about reading comprehension and its teaching, this paper characterizes patterns of development in three related domains: theory and research about basic processes in reading comprehension, research about reading comprehension instruction, and practices in teaching reading comprehension (as reflected by what practitioners think and do and by suggestions in basal reader manuals about how to develop children's reading comprehension ability). The paper begins by discussing knowledge and beliefs about reading comprehension in the period from 1965 to 1970. It then presents changes in views of process and practice for the period from 1970 to 1985. Finally, the paper offers some predictions about new ventures in basic research, applied research, and instructional practice. (HOD)

**********
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
**********

ED253851

CENTER FOR THE STUDY OF READING

Reading Education Report No. 57

# THE COMPREHENSION REVOLUTION: A TWENTY-YEAR HISTORY OF PROCESS AND PRACTICE RELATED TO READING COMPREHENSION

P. David Pearson

University of Illinois at Urbana-Champaign

February 1985

Commentary by
Bertram Bruce

University of Illinois
at Urbana-Champaign
51 Gerty Drive
Champaign, Illinois 61820

Bolt Beranek and Newman Inc.
10 Moulton Street
Cambridge, Massachusetts 02238

U.S. DEPARTMENT OF EDUCATION
NATIONAL INSTITUTE OF EDUCATION
EDUCATIONAL RESOURCES INFORMATION
CENTER (ERIC)

X This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official NIE position or policy.

The work upon which this publication is based was performed pursuant to Contract No. 400-81-0030 of the National Institute of Education. It does not, however, necessarily reflect the views of this agency. A modified version of this report will appear in T. E. Raphael & R. E. Reynolds (Eds.), Contexts of school-based literacy. New York: Longman's Inc.

CS 007 927

Abstract

This paper is a set of historical reflections upon the ideas and events that have shaped our current and future views about the nature of reading comprehension and our practices for teaching reading comprehension. The scene is set in the period from 1965-1970. Then changes in views of process and practice are documented for the period from 1970 to 1985. Finally, some predictions are offered about new ventures in basic research, applied research, and instructional practice.

# The Comprehension Revolution: A Twenty-Year History of Process and Practice Related to Reading Comprehension

The purpose of this essay is to characterize the patterns of development in three related domains: theory and research about basic processes in reading comprehension, research about reading comprehension instruction, and practices in teaching reading comprehension (as reflected by what practitioners think and do and by suggestions in basal reader manuals about how to develop children's reading comprehension ability). I begin by trying to characterize our knowledge and beliefs in the period from 1965-1970. Then I try to answer the question, What have we learned since 1970? Finally, I speculate what the future holds for us in terms of possible advances in our knowledge of both process and practice.

## The Scene in 1970

### What We Knew About Process in 1970

In 1970, our knowledge of reading comprehension was fairly well defined by four research strands: readability, the cloze procedure, factor analytic studies, and, the child-bride of the field, psycholinguistics.

Readability research (studying what made texts easy or difficult to understand) by that time had a history of 35 to 40 years stemming back to Gray and Leary (1935) and Lorge (1939) in the thirties, carried on by Flesch (1948) into the forties and George Klare (1963) into the fifties and sixties. Basically what

the research told us was that long words and long complex sentences were hard to understand. But we were not sure why. We did not know whether long words and sentences caused, or were merely symptoms of, content that was hard to read for other reasons, such as concept density.

The cloze technique (a procedure in which one deletes every 5th or 10th or nth word in a text and requires students to guess what fits in the resulting blanks) had been with us for a decade and a half. Taylor (1954), Rankin (1965), and Bormuth (1967, 1969) had used it to great advantage in refining research in comprehension and readability. If nothing else, we knew that we had a good dependent variable for measuring comprehension: It was objective (it did not depend on a test writer's judgment about what questions were important to ask), easy to score, and highly reliable.

It is probably fair to say that Davis (1944) made factor analysis studies (factor analytic studies try to determine whether different tests measure the same or different underlying trait(s)) of reading comprehension respectable. Between 1944 and 1969 several important factor analytic studies of reading comprehension all shared the common purpose of trying to isolate independent components of reading comprehension. All found only a few factors, such as word difficulty and reasoning, to be independent components of reading comprehension.

If readability, cloze, and factor analytic studies represented the conventional wisdom concerning reading comprehension, then psycholinguistics (the interface between psychology and linguistics) was the hope of the future. Simons' (1971) review of reading comprehension reflected this hope. After reviewing and discussing the conventional perspectives on reading comprehension, Simons raised the banner of transformational grammar as the guiding light of the future.

Psycholinguistics had tremendous, immediate, and unprecedented appeal. Part of its appeal stemmed from the impact that Chomsky's (1957) views had on the psychology of language in the decade of the sixties. Based upon studies like those of Miller and Isard (1963), Mehler (1963), Gough (1965), and Slobin (1966), there was a genuine feeling that behavioristic views of language development and processing would have to be replaced by views that were both nativistic (people are born with a genetic capability to learn language) and cognitive (admitting that there is more than a blank black box in the brain) in orientation. Furthermore, these research studies seemed to suggest that the transformational generative grammar created by Chomsky might actually serve as a model of human language processing. Thus, there was a ready-made theory waiting to be applied to reading comprehension. And psycholinguistics commanded academic respectability. There was something invigorating about standing on the shoulders of the new psychology, working within a paradigm

for which there was a model that made fairly precise predictions and, thus, had testable hypotheses.

Beginning in the late sixties and extending into the mid-seventies, considerable empirical and theoretical work was completed within the psycholinguistic tradition. The influence of psycholinguistics on reading is nowhere better demonstrated than in the work of Kenneth Goodman (1965) and Frank Smith (1971). For both Goodman and Smith, looking at reading from a psycholinguistic perspective meant looking at reading in its natural state, as an application of a person's general cognitive and linguistic competence. It seems odd even to mention their names in discussing the influence of psycholinguistics on comprehension research because neither Goodman nor Smith distinguishes between reading and reading comprehension. Their failure to make the distinction is deliberate, for they would argue that reading <u>is</u> comprehending (or that reading without comprehending is <u>not</u> reading). Similarly, a distinction between word identification and comprehension would seem arbitrary to them.

For others, the influence of the psycholinguistic tradition (particularly the use of transformational-generative grammar as a psychological model) on views of reading comprehension was quite direct. The work of Bormuth (1966, 1969), Bormuth, Manning, Carr, and Pearson (1971), Fagan (1971), and Pearson (1974-75)

reveals a rather direct use of psycholinguistic notions in studying reading comprehension.

Such was the scene in the early seventies. The conventional modes of research, while still strong, were being challenged by a new interloper from the world of linguistic research--psycholinguistics.

## What We Knew About Practice in 1970

Unlike the late 1970s and early 1980s, there were few complex and thorough analyses of how comprehension was taught in classrooms or in basal series prior to the early 1970s. The following attitudes and practices regarding the teaching of reading comprehension skills seem evident:

1. Many scholars wondered whether comprehension skills could be taught at all.

2. Some thought it was a matter for the later grades, to be dealt with once decoding skills were mastered.

3. Most thought that comprehension skill resulted from practicing separable skills within a balanced scope and sequence extending across the elementary years.

4. The most common criterion for sequencing comprehension skills was from literal to inferential to creative.

5. Children's ability to answer questions was considered to be the most basic piece of evidence that they could comprehend and was thought by many to be the best path to nurturing comprehension.

Can comprehension be taught? Perhaps the clearest argument for the resistance of comprehension to direct teaching came from the philosophy underlying the so-called linguistic readers that were fairly popular from 1963 through the early 1970s. These readers forbade asking comprehension questions in the early books, and they used content that was not at all predictable from a student's oral language base. The rationale for avoiding comprehension questions at all in the early grades was that once children could decode written symbols into a speech code, they could comprehend by listening to themselves say the words. Therefore, questions were superfluous. The rationale for unpredictable language was that guessing could get in the way of the real task confronting the child: Learning the code for translating print to speech. These attitudes toward comprehension were not limited to those who sided with a linguistic approach to beginning reading. Further evidence for the view that comprehension cannot be taught is found in the emphasis upon questioning (what Durkin, 1978-79, later came to call assessment) and the practice of guaranteeing that students completed worksheets on a wide range of comprehension skills; after all, if comprehension cannot be taught, then simply allowing students to practice doing it may be the sensible avenue to improvement.

Decoding first/comprehension later. Not all reading series adopted the decoding first-comprehension later philosophy

absolutely; in fact, this philosophy can only be found in early versions of linguistic series. However, the relative emphasis given to decoding versus comprehension activities in the early versus later grades in all basal series indicates a bias toward this decoding first-comprehension later viewpoint (see Chall, 1967).

Balanced diet of separable skills. Regarding a balanced diet of separable skills, even a cursory examination of any of the popular basals of that period (or today, for that matter) reveals a solid reliance on making sure that many different skills are practiced at all grade levels (see Pearson & Johnson, 1978).

Sequencing skills. The progression from literal to inferential to creative comprehension comes packaged in many different ways: from getting the facts straight to using the facts, reading the lines to reading between the lines to reading beyond the lines. But the underlying philosophy is the same: Students cannot do anything with the facts until they have them straight; hence, literal comprehension has to be emphasized first. The evidence for this progression comes from Guszak's (1967) study. He found that the proportion of higher level questions in basal story discussion increased from grade 2 to 4 to 6; however, even at grade 6, the overall emphasis was on literal comprehension questions.

The dominance of questions. The dominant reliance on questions for assessing and "instructing" comprehension emerges clearly in Guszak's study, as well as in an examination of basal manuals in that era. There is reason to believe that patterns have changed little since that period.

There is little evidence from this period that the research and theoretical work about the process(es) of comprehension were influencing practice in comprehension instruction. Note, for example, the widespread use of long lists of comprehension skills in the face of factor analytic studies demonstrating few distinguishable skills. This tension between research and practice seems to transcend historical periods; it will resurface when we evaluate the impact of more recent research and theory on current practices.

## What We Have Learned Since 1970

### About the Process

The force behind the shift from behavioristic to cognitive views of language was a linguist, Noam Chomsky. He exposed the prevailing views on the psychology of language for their gross inadequacies and provided an alternative model (transformational grammar) of language processing. Fittingly, the motive force behind the exodus from a narrow psycholinguistic view based upon transformational grammars was another linguist, Charles Fillmore. In 1968, he published a paper in which he argued for the resurrection of a centuries-old case grammar approach to

linguistic explanation. Case grammars are based upon the different relationships between the verb in the sentence and the case (nominative, accusative, recipient, etc.) that the nouns take in relationship to the verb.

Fillmore's case grammar was appealing to psychologists and educators who were experiencing great difficulty with models of comprehension based upon a transformational generative grammar. Those very models that had seemed to be sensible and alluring only five years earlier had not withstood tests of empirical verification. With their emphasis on transformations to realize a variety of surface structures from a single deep structure, transformational models had to stress an analytic view of comprehension. Yet researchers (e.g., Bransford & Franks, 1971) were collecting data that indicated that comprehension consisted of synthesis (integrating ideas) rather than analysis (decomposing ideas). Other researchers (e.g., Sachs, 1967) found that comprehension and recognition memory seemed to be more sensitive to semantic rather than syntactic factors, contrary to the emphasis in a transformational model. Still others, like Pearson (1974-1975), found that the predictions from a derivational theory of complexity (i.e., the theory that comprehension difficulty varies as a function of the number of transformations necessary to travel from the surface structure of a sentence to its deep structure) were exactly the opposite of results obtained in several comprehension studies.

In such a milieu, something like Fillmore's case grammar was quite appealing; it emphasized synthesis rather than analysis and semantic rather than syntactic relations. In addition, case grammar allowed one to begin to examine relations that held between linguistic ideas that crossed sentence boundaries.

The psycholinguistic tradition, based as it was on Chomsky's transformational grammar, had concentrated upon the sentence as the basic unit of analysis. Somewhere in the early to mid-seventies, the proposition (basically, a verb plus the nouns, adjectives, and adverbs that go along with it) replaced the sentence as the basic unit of analysis. Researchers in artificial intelligence began using it in the early seventies (Minsky, 1975; Schank, 1973). Lindsay and Norman (1972) discussed propositions in their revolutionary experimental psychology textbook. Kintsch (1974), Rumelhart (1975), Frederiksen (1975), Thorndyke (1977), and Stein and Glenn (1977) were all using propositions to parse texts and analyze recall protocols by the mid to late 1970s.

The proposition fit nicely with an emphasis on case grammar. Just as the verb is the center of a proposition [another way of defining a proposition is as a predicate (active or stative verb) and its arguments (nouns, adjectives, adverbs)], so the verb is the central node in a case grammar parsing (parsing is a sort of fancy diagramming) of a sentence. All other form classes revolve around the verb. Also, many of the case relations in a case

grammar are really relations among propositions (e.g., cause, condition, time, manner).

As we moved into the late 1970s, no new revolutions occurred; fine tuning better characterizes what took place. The perspective that spawned case grammars and propositions persisted, but the problems researchers addressed changed substantially. In the early 1970s text researchers were still preoccupied with relations within and between sentences, and their research reflected this emphasis on what we have come to call "microstructure." Text researchers in the late 1970s were more concerned about relations that obtain between whole episodes in stories or whole paragraphs or sections in informative text; we have come to call this more wholistic emphasis "macrostructure." Accompanying this shift in the study of text was a shift in the study of how human memory is organized, in particular how humans are able to store and retrieve large bodies of information. This latter movement came to be called "schema theory."

Researchers in this period tended to fall into two categories: those who tried to characterize relations among ideas in texts and those who have tried to characterize relations among ideas stored in human memory. Neither group denied the importance or necessity of the other's work; each group simply chose to emphasize one area over the other. Hence, researchers like Rumelhart (1975), Stein and Glenn (1977), and Thorndyke

(1977) gave us plausible macrostructures for narrative material in the form of story grammars. Researchers like Meyer (1975) or Halliday and Hasan (1976) tried to provide more general structural accounts that would apply equally well to expositions. Alternatively, the work of Schank (1973), Minsky (1975), Anderson (1977), and Rumelhart (1980; Rumelhart & Ortony, 1977) was more concerned with the structure of knowledge within the human processors (i.e., readers). Still others, such as Kintsch (1974) or Frederiksen (1975) seemed to be trying to provide a balanced emphasis on text and knowledge structure. These differences are more a matter of degree than kind. All of the researchers were concerned with human information processing; they simply tended to emphasize different aspects of the processing. Therefore, researchers focusing on the structure of the text were likely to emphasize something like the number of high level propositions within the story that were recalled. Conversely, those emphasizing the structure of the reader's knowledge were more likely to dwell upon something like non-textual inferences made during recall or how a reader's prior knowledge determines aspects of the text that will be remembered. Put differently, the former group were likely to highlight text structures while the latter group were likely to highlight knowledge structures.

Sometime during the late seventies, a new interloper burst onto the research stage, bearing the cumbersome but intellectually appealing label of metacognition. It seemed a

logical extension of the rapidly developing work on both schema theory and text analysis. These latter two traditions emphasized declarative knowledge, knowing that X or Y or Z is true, but were scant on specifying procedural knowledge, knowing how to engage a strategy for comprehension or memory (see Gavelek, in press; Paris, in press; or Schwartz, in press). This is precisely the kind of knowledge that metacognitive research has emphasized. The key words associated with metacognition reveal its emphasis: awareness, monitoring, control, and evaluation.

Two parallel strands of research dominated the early work in metacognition. The first, metamemory research, is most typically associated with John Flavell and his associates at Stanford. They have discovered that along with the capacity to remember more information, human beings develop tacit and explicit strategies for remembering. The second line of research, metacomprehension, is more typically associated with Ann Brown and Joe Campione and their colleagues at Illinois, and more recently with Ellen Markman at Stanford and with Scott Paris at Michigan. It emphasizes the strategies that readers use while they are reading as they monitor, evaluate, and repair their comprehension of written text. This line of research has grown so rapidly that it has been reviewed several times within the last few years (Wagoner, 1983; Paris, Lipson, & Wixson, 1983; Baker & Brown, 1984).

Given the tremendous outpouring of research on basic processes in comprehension since the mid-seventies, it is fair to ask what we have learned from it all. The answer, I think, is that we have learned a considerable amount. We view comprehension very differently from the way we did in 1970. Our knowledge is both more extensive and more refined. Here is a sampling of some insights that we have gained.

Prior knowledge (in the form of schemata) influences our comprehension to a much greater degree than earlier research would have suggested. Anderson (1984) has summarized the influences that schemata play in our comprehension in these generalizations (these are close paraphrases of Anderson's assertions):

1. Schemata provide ideational scaffolding for assimilating text information. Schemata have slots that readers expect to be filled with information in a text. Information that fills those slots is easily learned and remembered.

2. Schemata facilitate the selective allocation of attention. Put simply, schemata guide our search for what is important in a text, allowing us to separate the wheat from the chaff.

3. Schemata enable inferential elaboration. No text is ever fully explicit. Schemata allow us to make educated guesses about how certain slots must have been filled.

4. Schemata allow for orderly searches of memory. For example, suppose a person is asked to remember what he did at a recent cocktail party. He can use his cocktail party schema, a specification of what usually happens at cocktail parties, to recall what he ate, what he drank, who he talked to, and so on.

5. Schemata facilitate editing and summarizing. By definition, any schema possesses its own criteria of what is important. These can be used to create summaries of text that focus on important information.

6. Schemata permit inferential reconstruction. If readers have a gap in their memory, they can use a schema, in conjunction with the information recalled, to generate hypotheses about missing information. If they can recall, for example, that the entree was beef, they can infer that the beverage was likely to have been red wine.

So powerful is the influence of prior knowledge on comprehension that Johnston and Pearson (1982; see also, Johnston, 1984) have found that prior knowledge of topic is a better predictor of comprehension than is either an intelligence test score or a reading achievement test score.

Reading is a dynamic, interactive process. To use the language of Collins, Brown, and Larkin (1979), as we read, we are constantly revising our model of what the text means. To view an individual's comprehension of a text as an inadequate

reproduction of the original text misses the whole point about the reader's enormous contribution to the comprehension process.

Reading involves the use of many different kinds of knowledge. We have already discussed two of these, declarative and procedural knowledge. Recall that declarative knowledge, knowing that, includes our knowledge of the world at large and our knowledge of the world of text (prototypical structures and authorial devices); recall that procedural knowledge, knowing how, includes the strategies we use to become aware of, monitor, evaluate, and repair our comprehension. To these, Paris (Paris, in press; Paris, Lipson, & Wixson, 1983) argues convincingly that we should add conditional knowledge, knowing when and why to call up a particular strategy to aid our comprehension. The point is that we cannot characterize comprehension processes without including all of these kinds of knowledge.

Reading and writing are a lot more similar in process than we had ever thought. Traditionally, in comparing the language arts, we have tended to think of reading and writing as mirror images of one another--that when we read, we more or less undo what writers do when they write. Even the attributes we assign to them--productive versus receptive language--reflect this oppositional view. While the research base arguing for the similarity rather than the difference between reading and writing is weak (see Hansen, in press; Tierney, Leys, & Rogers, in press), many theorists have begun to emphasize essential

similarities (e.g., Murray, 1982; Tierney & Pearson, 1983; Pearson & Tierney, 1984). Even though strict comparative research is just beginning, one can make the argument for similarity by examining the conclusions permitted from research on the role that schemata play in comprehension (cf. pp. 16-17). Notice that terms like constructive and reconstructive processes are used to describe what we know about comprehension; these are the very terms writing researchers use to describe the writing process.

About Practice

It is fair to conclude that more research about reading comprehension practices has been conducted since 1975 than in the 100 years prior to 1975. One reason for this sudden barrage is that we understand the basic processes involved in comprehension better than we used to. However, another reason is that practitioners are more concerned about teaching comprehension skills now than they ever have been. Perhaps the gradual decline of SAT scores and the consistent drop in inferential reasoning scores on National Assessment tests have contributed to awareness and concern.

Research on reading comprehension instruction tends to fall into one of three categories (see Pearson & Gallagher, 1983). Some studies attempt to describe what is going on in the name of reading comprehension, either in our schools or our textbooks. Other studies attempt to try out different ways of teaching or

allowing students to practice reading comprehension strategies or activities. They represent what we might call pedagogical experiments and try to evaluate competing practices over relatively short but intensive treatment periods (1 to 10 weeks). A few studies with more of a program evaluation flavor examine a practice or set of practices embedded into a larger curriculum.

Descriptions. From descriptions, we have learned much about what is not being done in schools and what is not suggested for teachers to do in manuals. Durkin, in two studies (1978-79; 1981), has demonstrated that little direct instruction of comprehension skills occurs in intermediate grade classrooms (1978-79) or is suggested in teacher manuals (1981). Instead of offering students advice about how to employ reading skills, teachers and manuals tend to assess comprehension by asking or suggesting many questions about the selections students read and by providing enormous quantities of practice materials in the form of worksheets and workbooks. Sometimes, teachers or manuals "mention," or say just enough about the skill so that students understand the formal requirements of the task. Rarely do teachers or manuals require application of the skill to reading real texts. Even more rarely do they discuss the kind of conditional knowledge suggested by Paris, et al. (1983). Most recently, Durkin (1984) has found that teachers rarely use that section of the teachers' manual suggesting background knowledge

activities but rarely skip story questions or skillsheet activities.

Beck and her colleagues at Pittsburgh (Beck, McKeown, McCaslin, & Burkes, 1979) have found several features of commercial reading programs that may adversely affect comprehension. Among them are the use of indirect language (using high frequency words such as "this" or "him" instead of lower frequency but more image-evoking words like garbage can or Mr. Gonzalez), elaborate but misleading pictures, inappropriate story divisions, misleading prior knowledge and vocabulary instruction, and questions that focus on unimportant aspects of the stories students read.

Other descriptive studies have concentrated more on pupil texts than on teacher manuals or classroom instruction. For example, Davison and Kantor (1982) studied the kinds of adaptations publishers make when they rewrite an adult article for students in order to meet readability guidelines. They found a number of examples of practices that may actually make passages harder rather than easier to understand: (a) reducing sentence length by destroying interclausally explicit connectives, (b) selecting simpler but less descriptive vocabulary, (c) altering the flow of topic and comment relations in paragraphs, and (d) eliminating qualifying statements that specify the conditions under which generalizations are thought to hold.

Anderson and Armbruster (Anderson, Armbruster, & Kantor,

1980; Armbruster & Anderson, 1981, 1982, 1984) have examined a number of dimensions of studert text material in social studies and science that may cause unintentional difficulty. Among their observations are that content area texts often (a) fail to structure the information within a predictable and recurrent frame (like a schema for text), (b) use subheadings that do not reveal the macrostructure of the topic, (c) avoid using visual displays of information, particularly to summarize information presented textually, (d) use obscure pronoun references, and (e) fail to use obvious connectives, such as because, since, before, and after, even when these connectives clearly fit.

To make the picture even drearier, Bruce (1984) has compared basal stories to those found in trade books and concluded that basal stories avoid features commonly found in stories, such as inside view, internal conflict, and embedded narratorship. In a similar vein, Gallagher and Pearson (1982) found a wide discrepancy between the kinds of text structures found in informational selections in basals and in content area textbooks.

Any summary of the descriptive research cited thus far is doomed to be dismal. Many texts are hokey and misleading; teacher manual suggestions tend to be scant, misleading, or unhelpful, and teachers do not seem to teach very much in the way of comprehension skills and strategies. Perhaps pedagogical experiments will yield a more optimistic view of comprehension instruction.

Pedagogical experiments. Since 1975, a renaissance has taken place in instructional research, and most of the work has been directed toward the development of reading comprehension strategies. While it is beyond the scope of this overview to review that research in depth (see Pearson & Gallagher, 1983, or Tierney & Cunningham, 1984, for complete summaries), the following is a summary of the conclusions that I believe are permitted from this research.

1. Students understand stories better if they are asked questions that focus on integrating story parts than if they are asked questions that do not have a focus (e.g., Beck, Omanson, & McKeown, 1982; Gordon & Pearson, 1983; Singer & Donlan, 1982; Tharp, 1982).

2. Students understand informational texts better if discussions are guided by an attempt to help them see how all the pieces of information in a text fit together than if discussions are guided by a close but piecemeal interrogation of the main points and facts (Gallagher & Pearson, 1983).

3. Vocabulary instruction that focuses on building rich semantic networks of related concepts facilitates transferable growth in both vocabulary and comprehension. It is even better than either a definitional or a context approach (Beck, Perfetti, & McKeown, 1982; Johnson, Toms-Bronowski, & Pittleman, in press; Schachter, 1978).

4. Vocabulary growth is also facilitated by simply reading; however, it is likely that such growth is better characterized as the development of what Isabel Beck (1984) calls an "acquaintanceship" with words rather than "ownership" of concepts (Nagy, Herman, Anderson, & Pearson, 1984).

5. Building background knowledge prior to reading facilitates comprehension of the upcoming story or article, and it helps to develop a set within students for learning and evaluating new material in terms of what they already know (Hansen, 1981; Hansen & Pearson, 1983).

6. Teaching the so-called comprehension skills in a model that begins with a fairly heavy reliance on the teacher and builds toward student independence and ownership and that includes demonstrations of how to perform the skill is superior to a model that emphasizes practice, assessment, and more practice (Baumann, in press; Gordon & Pearson, 1983; Palincsar & Brown, 1984; Raphael & Pearson, in press; Raphael & Wonnacutt, in press).

7. Approaches that emphasize students' awareness of their own strategies suggest alternative strategies and help students learn techniques for self-monitoring result in sizable gains in comprehension performance (Palincsar & Brown, 1984; Paris, in press).

8. Approaches that emphasize inferential thinking result in greater growth in inferential thinking (at no loss to and sometimes a gain in literal comprehension) than do approaches that emphasize literal comprehension (Gordon & Pearson, 1983; Hansen, 1981; Hansen & Pearson, 1983; ).

Of these conclusions, numbers 6 and 7, both of which speak to the promise of explicit instruction in comprehension strategies, deserve special emphasis. In a sense, the studies that support these conclusions justify Durkin's (1978-79) concern about the lack of comprehension instruction in intermediate grade classrooms, for they suggest that student performance improves when teachers take the time and effort to help students learn how and why and when they should perform some of the complex comprehension and problem solving tasks that we require of them in schools.

Program evaluations. There have been two projects in which after new ideas about reading comprehension have been incorporated into a curriculum, the more or less long-term effects of that curriculum have been evaluated against competing curricula. The first project is located in Honolulu, and the effects of a comprehension-focused curriculum have been studied over a five year period (see Au & Kawakami, in press; Tharp, 1982). The second, located in Michigan, evaluated a metacognitive training program over a single school year, with a

followup eight months after the project ended (see Paris, in press).

What is remarkable about these two program evaluation studies is the similarity between their conclusions and those derived from the previous section on pedagogical experiments. While the tasks in the two sets of studies are sometimes different, the principles leading to effective performance are remarkably similar. Explicit instruction associated with guided practice, lots of opportunity to practice and apply strategies independently, as well as attention to monitoring the application of such strategies seems to help students perform better on a variety of comprehension measures.

The State of Practice in 1984

Given all the criticisms of current practice derivable from the descriptive research presented earlier, given the new insights implied by the basic research conducted since 1970, and given the promise of new and exciting techniques for teaching reading comprehension strategies emanating from recent pedagogical experiments and program evaluations, it is fair to ask whether or not reading programs used in today's schools are any different from those used in 1978 (the period that spawned the texts so heavily criticized) or, for that matter, in 1970 (our benchmark period). To answer this question, I conducted a very cursory examination of three popular basal series in their

1984 editions, looking for changes from earlier editions of the same series. Both positive and negative findings resulted.

On the positive side. Story questions are focused more on helping students develop the central thread of the stories they read. The proportion of inferential questions has risen dramatically, from about 20% to almost 50%, at least in the three series I have examined. Provisions for building background and setting purposes are stronger than ever, but then Durkin's recent article (1984) suggests that building background is the least used section of basal manuals.

Publishers seem to be trying to take Durkin's comments (1978-79, 1981) on the paucity of direct comprehension instruction in classrooms and manuals seriously; unfortunately, the efforts have not worked too well. The problem here, I think, is that good comprehension instruction is too interactive and dynamic to be captured easily in an abstract set of directions written for some hypothetical teacher working with a hypothetical set of students. Nonetheless, the old adage that comprehension cannot be taught seems to have died a graceful death. There is evidence that we are at least trying to do it.

The decoding first--comprehension later philosophy seems also to have found its grave. All aspects of comprehension, including inferential questions and skills are included early and often. Interestingly, this has not resulted in a loss in emphasis placed on decoding skills; if anything, early decoding

programs are stronger than ever. I think that now there is simply more to teach in the early programs. In this regard, it is important to note that the linguistic series that exemplified this philosophy most clearly are now little more than items of historical curiosity.

On the negative side. The long lists of comprehension skills in a scope and sequence chart persist. All the work emphasizing the similarity of most comprehension tasks (remember those early factor analytic studies) seems not to have found its way into reading series yet.

The emphasis on assessment (story questions) and practice (lots of worksheets) that Durkin found in the late 1970's remains, and, if anything, is even stronger. This is apparent not only in the mainline workbook and worksheet components, but also in the supplementary components that are available for students who, by virtue of low mastery test scores, earn the opportunity for more "practice."

A new development, since the 1970 editions of basal series, is the systematic inclusion of mastery tests for all the levels (and often all the units within a level) in a series. The tests are provided to assess mastery of skills that are taught at that level (or in that unit). The net effect of these mastery test components has been to heighten the emphasis on practice as the primary means of skill improvement and remediation (since more worksheets is the usual remedy for a noted deficiency).

A Note About Impacting Materials

The potential for impact by changing the materials of instruction is great. We know that students read basals and that teachers use manuals. I am encouraged by the receptivity of publishers to new ideas from research. At the Center for the Study of Reading, we have been involved in two conferences (and are planning a third) in which researchers and publishers have met together to address both general and specific issues about improving materials. But if we really want new and different approaches in basals, then consumers, those who buy basals for schools, will have to carry the bulk of the responsibility in persuading publishers to change. Book companies are, in fact, profit making organizations; they are therefore unlikely to produce something that they do not think their customers want.

What I have said about basals also applies, of course, to tests, and here the need for reform is even more crucial. Assessment in American education truly does drive instruction, even that in basals. We are unlikely to convince people that they should be teaching metacognitive monitoring skills, for example, if what teachers think they are accountable for is literal comprehension and sequence of events. Conversely, if we can infuse these new strategies into widely used tests, then these strategies are more likely to be taught (or at least practiced).

## Some Future History

### Basic Process Research

The schema theory tradition has provided us with an alternative world view about comprehension processes. But it has emphasized the effect of existing knowledge on comprehension. In the future, researchers will turn their attention to the more difficult question of schema acquisition, or, if you will, the effect of comprehension on knowledge. We will look more carefully at what Bransford, Nitsch, and Franks (1977) identified as the issue of "changing states of schema." And when we do, we will, of course, be returning to a recurrent theme in psychology usually labelled "learning." A vital component of this work on schema acquisition will focus on the issue of vocabulary (it has, in fact, begun—see Nagy & Anderson, in press; and Nagy, Herman, Anderson, & Pearson, 1984), for we will finally recognize that words are but the surface representations of our knowledge.

The text analysis tradition will change its focus also. Now that we can do a decent job of parsing texts to characterize underlying relations among ideas, we will turn to an age-old issue, What makes a text readable? And our search will be guided by principles very different from long sentences and hard words. In their place, we will substitute principles that come under the label of considerateness (see Armbruster & Anderson, 1981, 1982, 1984); these principles will emphasize whether authors provide frameworks for interrelating ideas, analogies that permit cross-

topical comparisons, and examples that solidify concept acquisition.

Schema-theoretic and text-analysis traditions will merge so as to become indistinguishable from one another. This event will result from our discovery that the goal of every author is the same as the goal of every reader--to represent knowledge in as coherent a framework as possible.

We will learn much more about basic relationships between reading and writing, more specifically between comprehension and composing strategies. The promise of an exciting integrated view of language processes, expressed so eloquently by many in recent years, will finally reach fruition.

Finally, we will develop the grace and good judgment necessary to overcome our tendency to debate whether reading is a word-based or a meaning-based process so that we can come to understand the intrinsic relationship between growth in comprehension strategies and growth in word identification abilities, particularly in beginning reading.

Instructional Practice Research

We will discover the precise ways in which writing activities benefit reading comprehension and vice-versa. We will also develop and evaluate programs in which children are taught to read texts for different purposes and from different perspectives (see Wixson & Lipson, in press). For example, we will learn that even young children can be taught to read texts

from the perspective of an editor or a critic, and that such instruction benefits both their own writing and their critical reading skills.

We will discover that the benefit of explicit instruction found in many of the existing pedagogical experiments and program evaluation studies of the early 1980's derives not so much from the explicitness of the instruction as it does from the considerateness of that instruction and from the collaboration that is required when teachers and students learn that it is all right to share cognitive secrets publicly.

We will make even greater strides in learning how to help students develop those mysterious evaluation, monitoring, and repair strategies that come under the rubric of metacognition. Our greatest progress will come in the area of repair strategies.

We will learn that we can get by without an entire compendium of comprehension skills in our scope and sequence charts. We will finally admit what we have known for 30 years: that they all reduce to a few basic cognitive processes like summarizing, detecting relationships in an explicit message, filling in gaps in incomplete messages, fixing things up when they go wrong, and detecting tricks authors use to try to con us.

## The State of Practice in 1990

What, then, will be going on in our schools in the year 1990 in the name of reading comprehension? Will any current or future research find its way into practice? The answer to these

questions is quite complex for it requires that we consider not only issues of reading comprehension processes and instruction but also issues of dissemination and change. While I think the gap between research and practice will always exist, I am optimistic about narrowing it. My optimism stems from two observations. First, the research of the last decade is more deserving of implementation than that of earlier decades. It is more central to what reading is all about, and it is more focussed on issues that impact what teachers are responsible for in their classrooms. Second, practitioners are more receptive to research findings than they have been at least during the 20 years that I have been in the field.

Let me close by outlining what I believe to be the requirements of an effective collaborative program for promoting educational change in our schools. There are several essential ingredients that have to be present in such efforts in order for them to work effectively.

1. Teachers have to <u>want</u> to try something new. There has to be some disequilibrium in their own minds as a motive for trying something new. It takes a fair amount of courage to admit (even to ourselves) that what we are doing presently is not what we want to be doing.

2. Teachers have to have at least some administrative support. The more the better. They need someone up there saying that this is a good idea.

3. The people who are doing the changing--the teachers--have to have a voice in planning for change. Others can try to legislate it, but it proceeds much more smoothly when teachers feel a sense of ownership of the project. Parity between teachers and change agents is essential.

4. Services must be delivered at the level of the people doing the changing. It's not really enough to give a couple of lectures to a group of administrators and supervisors. Change occurs more rapidly when the change agents work directly with teachers in their classrooms and schools.

5. Change agents have to establish a forum in which teachers can interact with one another on things that matter and in which teachers are rewarded for behaving professionally. In two efforts I have been involved with this last year, I have come to the conclusion that my most important role as a change agent is to establish such a forum. Teaching can be a very lonely profession, even when you are in the constant company of your peers. A friend of mine says that the best index of the professional climate of a school is the topic of conversation in the teachers' lounge. She is probably right. Indeed, the teachers in our two projects have corroborated just such a phenomenon in their schools: they have found themselves discussing different issues than they used to, and they find themselves using one another as resources.

6. Change efforts need time!

Now, how does what I have said about comprehension research fit with what I have just outlined as a set of requirements for effective change? I do not want to conclude that disseminating knowledge about research is any better or any worse than working with teachers directly on change efforts. While direct collaboration is probably more powerful, without the production and dissemination of new knowledge, we might not have any ideas worth implementing. Materials and tests will continue to have an impact on practice whether we like it or not--to avoid getting our hands dirty in this arena is to seal our fate as powerless bystanders. But neither the new knowledge nor the new material will do us any good, unless we learn to work together on matters we care about. I see that cooperative potential all over the country: in Hickory Hills, Illinois, and at Metcalf School in Bloomington, Illinois; in Orange County, Florida, and in Kalispell, Montana; in New York City and in Zion, Illinois, and in Fairfax County, Virginia; in Montgomery County, Maryland, and in Honolulu; in Wading River, New York, and Media, Pennsylvania. But there is hope in our discontent. Many teachers are tired of curricula and testing programs that drive teachers into corners and children away from books. There is also hope, and high expectation, amidst the dillusionment espoused by the critics of education and the fear engendered by those who want to coerce us into change through legislation requiring new and tougher

standards for skills we know are not at the heart of literacy. Working together is our only option; for if we do not, we will lose the day to the more hostile forces of coercion. I'd rather we changed our school curricula because we realized that we had found more effective choices than because some quasi-official body told us we had to.

References

Anderson, R. C. (1977). The notion of schemata and the educational enterprise. In R. C. Anderson, R. J. Spiro, & W. E. Montague (Eds.), Schooling and the acquisition of knowledge. Hillsdale, NJ: Erlbaum.

Anderson, R. C. (1984). Role of the reader's schema in comprehension, learning, and memory. In R. C. Anderson, J. Osborn, & R. J. Tierney (Eds.), Learning to read in American schools. Hillsdale, NJ: Erlbaum.

Anderson, T. H., Armbruster, B. B., & Kantor, R. N. (1980). How clearly written are children's textbooks? Or, of bladderworts and alfa (Reading Education Rep. No. 16). Urbana: University of Illinois, Center for the Study of Reading. (ERIC Document Reproduction Service No. ED 192 275)

Armbruster, B. B., & Anderson, T. H. (1981). Content area textbooks (Reading Education Rep. No. 23). Urbana: University of Illinois, Center for the Study of Reading. (ERIC Document Reproduction Service No. ED 203 298)

Armbruster, B. B., & Anderson, T. H. (1982). Structures for explanations in history textbooks, or so what if Governor Stanford missed the spike and hit the rail? (Tech. Rep. No. 252). Urbana: University of Illinois, Center for the Study of Reading.

Armbruster, B. B., & Anderson, T. H. (1984). Producing considerate expository text: Or easy reading is damned hard writing (Reading Education Rep. No. 46). Urbana: University of Illinois, Center for the Study of Reading.

Au, K. H., & Kawakami, A. J. (in press). The influence of the social organization of instruction on children's text comprehension ability: A Vygotskian perspective. In T. E. Raphael & R. Reynolds (Eds.), Contexts of school-based literacy. New York: Longmans.

Baker, L., & Brown, A. L. (1984). Metacognitive skills of reading. In P. D. Pearson (Ed.), Handbook of reading research. New York: Longmans.

Baumann, J. F. (in press). The effectiveness of a direct instructional paradigm for teaching main idea comprehension. Reading Research Quarterly.

Beck, I. L. (1984). Developing comprehension: The impact of the directed reading lesson. In R. C. Anderson, J. Osborn, & R. J. Tierney (Eds.), Learning to read in American schools. Hillsdale, NJ: Erlbaum.

Beck, I. L., McKeown, M. G., McCaslin, E. S., & Burkes, A. M. (1979). Instructional dimensions that may affect reading comprehension: Examples from two commercial reading programs. Pittsburgh: University of Pittsburgh, Learning Research and Development Center.

Beck, I. L., Omanson, R. C., & McKeown, M. G. (1982). An instructional redesign of reading lessons: Effects on reading comprehension. Reading Research Quarterly, 17, 462-481.

Beck, I. L., Perfetti, C. A., & McKeown, M. G. (1982). The effects of long-term vocabulary instruction on lexical access and reading comprehension. Journal of Educational Psychology, 74, 506-521.

Bormuth, J. R. (1966). Readability: A new approach. Reading Research Quarterly, 1, 79-132.

Bormuth, J. R. (1967). Implications and use of cloze procedure in the evaluation of instructional programs (Occasional Rep. No. 3). Los Angeles: University of California, Center for the Study of Evaluation Instructional Programs.

Bormuth, J. R. (1969). An operational definition of comprehension instruction. In K. S. Goodman & J. F. Fleming (Eds.), Psycholinguistics and the teaching of reading. Newark, DE: International Reading Association.

Bormuth, J. R., Manning, J. C., Carr, J. W., & Pearson, P. D. (1971). Children's comprehension of between- and within-sentence syntactic structures. Journal of Educational Psychology, 61, 349-357.

Bransford, J. D., & Franks, J. J. (1971). The abstraction of linguistic ideas. Cognitive Psychology, 2, 331-350.

Bransford, J. D., Nitsch, K. E., & Franks, J. F. (1977). Schooling and the facilitation of knowledge. In R. C. Anderson, R. J. Spiro, & W. E. Montague (Eds.), Schooling and the acquisition of knowledge. Hillsdale, NJ: Erlbaum.

Bruce, B. (1984). A new point of view on children's stories. In R. C. Anderson, J. Osborn, & R. J. Tierney (Eds.), Learning to read in American schools. Hillsdale, NJ: Erlbaum.

Chall, J. (1967). Learning to read: The great debate. New York: McGraw-Hill.

Chomsky, N. (1957). Syntactic structures. The Hague: Moulton.

Collins, A., Brown, J. S., & Larkin, K. M. (1979). Inference in text understanding. In R. J. Spiro, B. C. Bruce, & W. F. Brewer (Eds.), Theoretical issues in reading comprehension. Hillsdale, NJ: Erlbaum.

Davis, F. B. (1944). Fundamental factors of comprehension in reading. Psychometrika, 9, 185-197.

Davison, A., & Kantor, R. N. (1982). On the failure of readability formulas to define readable texts: A case study from adaptations. Reading Research Quarterly, 17, 187-209.

Durkin, D. (1978-79). What classroom observations reveal about reading comprehension instruction. Reading Research Quarterly, 14, 481-533.

Durkin, D. (1981, February). Do basal reader manuals provide for reading comprehension instruction? Paper presented at the Center for the Study of Reading Publishers' Conference, Tarrytown, New York.

Durkin, D. (1984). Is there a match between what elementary teachers do and what basal reader manuals recommend? The Reading Teacher, 37, 734-745.

Fagan, W. T. (1971). Transformations and comprehension. The Reading Teacher, 25, 169-172.

Fillmore, C. (1968). The case for case. In E. Bach & R. G. Harms (Eds.), Universals in linguistic theory. New York: Holt, Rinehart & Winston.

Flesch, R. F. (1948). A new readability yardstick. Journal of Applied Psychology, 32, 221-233.

Frederiksen, C. H. (1975). Representing logical and semantic structure of knowledge acquired from discourse. Cognitive Psychology, 7, 371-458.

Gallagher, M. C., & Pearson, P. D. (1982). An examination of expository texts in elementary instructional materials. National Reading Conference, Clearwater, FL.

Gallagher, M. C., & Pearson, P. D. (1983). Fourth grade students' acquisition of new information from text. National Reading Conference, Austin, TX.

Gavelek, J. R. (in press). The social contexts of literacy and schooling: A developmental perspective. In T. E. Raphael & R. Reynolds (Eds.), Contexts of school-based literacy. New York: Longmans.

Goodman, K. S. (1965). A linguistic study of cues and miscues in reading. Elementary English, 42, 639-643.

Gordon, C., & Pearson, P. D. (1983, June). The effects of instruction in metacomprehension and inferencing on children's comprehension abilities (Tech. Rep. No. 277). Urbana: University of Illinois, Center for the Study of Reading.

Gough, P. E. (1965). Grammatical transformations and speed of understanding. Journal of Verbal Learning and Verbal Behavior, 4, 107-111.

Gray, W. S., & Leary, B. E. (1935). What makes a book readable: An initial study. Chicago: The University of Chicago Press.

Guszak, F. J. (1967). Teacher questioning and reading. The Reading Teacher, 21, 227-234.

Halliday, M. A. K., & Hasan, R. (1976). Cohesion in English. London: Longmans.

Hansen, J. (1981). The effects of inference training and practice on young children's reading comprehension. Reading Research Quarterly, 16, 391-417.

Hansen, J. (in press) Learners work together. In T. E. Raphael & R. Reynolds (Eds.), Contexts of school-based literacy. New York: Longmans.

Hansen, J., & Pearson, P. D. (1983). An instructional study: Improving the inferential comprehension of fourth grade good and poor readers. Journal of Educational Psychology, 75, 821-829.

Johnson, D. D., Toms-Bronowski, S., & Pittleman, S. (in press). An investigation of the effectiveness of semantic mapping and semantic feature analysis on vocabulary acquisition and retention. Reading Research Quarterly.

Johnston, P. (1984). Prior knowledge and reading comprehension test bias. Reading Research Quarterly, 19, 219-239.

Johnston, P., & Pearson, P. D. (1982, June). Prior knowledge, connectivity, and the assessment of reading comprehension (Tech. Rep. No. 245). Urbana: University of Illinois, Center for the Study of Reading.

Kintsch, W. (1974). The representation of meaning in memory. Hillsdale, NJ: Erlbaum.

Klare, G. (1963). The measurement of readability. Ames: Iowa State University Press.

Lindsay, P., & Norman, D. (1972). Human information processing. New York: Academic Press.

Lorge, I. (1939). Predicting reading difficulty of selections for children. Elementary English Review, 16, 229-233.

Mehler, J. (1963). Some effects of grammatical transformations on the recall of English sentences. Journal of Verbal Learning and Verbal Behavior, 2, 346-351.

Meyer, B. J. F. (1975). The organization of prose and its effects on memory. Amsterdam: North-Holland Publishing.

Miller, G. A., & Isard, S. (1963). Some perceptual consequences of linguistic rules. Journal of Verbal Learring and Verbal Behavior, 2, 217-228.

Minsky, M. A. (1975). A framework for representing knowledge. In P. Winston (Ed.), The psychology of computer vision. New York: McGraw Hill.

Murray, D. M. (1982). Teaching the other self: The writer's first reader. College Composition and Communication, 33, 140-147.

Nagy, W. E., & Anderson, R. C. (in press). How many words are there in printed school English? Reading Research Quarterly.

Nagy, W. E., Herman, P. H., Anderson, R. C., & Pearson, P. D. (1984). Learning words from context (Tech. Rep. No. 319). Urbana: University of Illinois, Center for the Study of Reading.

Palincsar, A. M., & Brown, A. L. (1984). Reciprocal teaching of comprehension-fostering and comprehension-monitoring activities. Cognition and Instruction, 1, 117-175.

Paris, S. C. (in press). Teaching children to guide their reading and learning. In T. E. Raphael & R. Reynolds (Eds.), Contexts of school-based literacy. New York: Longmans.

Paris, S., Lipson, M., & Wixson, K. (1983). Becoming a strategic reader. Contemporary Educational Psychology, 8, 293-316.

Pearson, P. D. (1974-75). The effects of grammatical complexity on children's comprehension, recall, and conception of certain semantic relations. Reading Research Quarterly, 10, 155-192.

Pearson, P. D. & Gallagher, M. C. (1983). The instruction of reading comprehension. Contemporary Educational Psychology, 8, 317-344.

Pearson, P. D., & Johnson, D. D. (1978). Teaching reading comprehension. New York: Holt, Rinehart, & Winston.

Pearson, P. D., & Tierney, R. J. (1984). On becoming a thoughtful reader: Learning to read like a writer. In A. Purves & O. Niles (Eds.), Becoming readers in a complex society. Chicago: National Society for the Study of Education, 144-173.

Rankin, E. (1965). Cloze procedure--a survey of research. Yearbook of the South West Reading Conference, 14, 133-148.

Raphael, T. E., & Pearson, P. D. (in press). Increasing students' awareness of sources of information for answering questions. American Educational Research Journal.

Raphael, T. E., & Wonnacutt, C. A. (in press). Metacognitive training in question-answering strategies: Implementation in a fourth grade developmental reading program. Reading Research Quarterly.

Rumelhart, D. E. (1975). Notes on a schema for stories. In D. G. Bobrow & A. M. Collins (Eds.), Representation and understanding: Studies in cognitive science. New York: Academic Press.

Rumelhart, D. E. (1980). Schemata: The building blocks of cognition. In R. J. Spiro, B. C. Bruce, & W. F. Brewer (Eds.), Theoretical issues in reading comprehension. Hillsdale, NJ: Erlbaum.

Rumelhart, D. E., & Ortony, A. (1977). The representation of knowledge and memory. In R. C. Anderson, R. J. Spiro, & W. E. Montague (Eds.), Schooling and the acquisition of knowledge. Hillsdale, NJ: Erlbaum.

Sachs, J. S. (1967). Recognition memory for syntactic and semantic aspects of connected discourse. Perception and Psychophysics, 2, 437-442.

Schachter, S. (1978). An investigation of the effects of vocabulary and schemata orientation upon reading comprehension. Unpublished doctoral dissertation, University of Minnesota.

Schank, R. C. (1973). Identification of conceptualizations underlying natural language. In R. C. Schank & K. M. Colby (Eds.), Computer models of thoughts and language. San Francisco: Freeman.

Schwartz, R. M. (in press). Teachers' classroom learning: Toward the development of expertise in reading instruction. In T. E. Raphael & R. Reynolds (Eds.), Contexts of school-based literacy. New York: Longmans.

Simons, H. D. (1971). Reading comprehension: The need for a new perspective. Reading Research Quarterly, 5, 338-363.

Singer, H., & Donlan, D. (1982). Active comprehension: Problem solving schema with question generation for comprehension of complex short stories. Reading Research Quarterly, 17, 166-186.

Slobin, D. T. (1966). Grammatical transformations and sentence comprehension in childhood and adulthood. Journal of Verbal Learning and Verbal Behavior, 5, 219-227.

Smith, F. (1971). Understanding reading: A psycholinguistic analysis of reading and learning to read. New York: Holt, Rinehart & Winston.

Stein, N. L., & Glenn, C. G. (1977, March). A developmental study of children's construction of stories. Paper presented at the Society for Research in Child Development meetings, New Orleans.

Taylor, W. (1954). Application of "cloze" and entropy measures to the study of contextual constraint in samples of continuous prose. Unpublished doctoral dissertation, University of Illinois at Urbana-Champaign.

Tharp, R. G. (1982). The effective instruction of comprehension: Results and description of the Kamehameha Early Education Program. Reading Research Quarterly, 17, 503-527.

Thorndyke, P. W. (1977). Cognitive structures in comprehension and memory of narrative discourse. Cognitive Psychology, 9, 77-110.

Tierney, R. J., & Cunningham, J. (1984). Research on teaching reading comprehension. In P. D. Pearson (Ed.), Handbook of reading research. New York: Longmans.

Tierney, R. J., Leys, M., & Rogers, T. (in press). Comprehension, composition, and collaboration: Analyses of communication influences in two classrooms. In T. E. Raphael & R. Reynolds (Eds.), Contexts of school-based literacy. New York: Longmans.

Tierney, R. J., & Pearson, P. D. (1983). Toward a composing model of reading. Language Arts, 60, 568-580.

Wagoner, S. (1983). Comprehension monitoring: What it is and what we know about it. Reading Research Quarterly, 18(3), 328-341.

Wixson, K. K., & Lipson, M. Y. (in press). Reading (Dis)ability: An interactionist perspective. In T. E. Raphael & R. Reynolds (Eds.), Contexts of school-based literacy. New York: Longmans.

# The Second Phase of the Comprehension Revolution

Bertram Bruce

> That afternoon Louis XVI returned to Versailles from a day's hunting, and entered a note into his diary: "July 14: Nothing." Then the Duc de La Rochefoucauld-Liancourt, arriving from Paris told him of the successful attack upon the Bastille. "Why," exclaimed the king, "this is a revolt!" "No, Sire," said the Duke, "it is a revolution."
>
> (Durant & Durant, 1967, p. 963)

Describing a historical trend from within is a formidable task; more so if one is trying to characterize revolutionary changes. The Duke of La Rochefoucauld-Liancourt saw more clearly than did his king that the events of France in 1789 were only the beginning of an ineluctable process that would ultimately transform their world. But, he would have had difficulty in identifying where that revolution might go.

## A Vantage Point

David Pearson, in "The comprehension revolution," also identifies a revolution, this time in the less dramatic, but equally important realm of reading. His analysis of past, present and future, trends in reading research and practice is a valuable base to which we can step back and ask "What have we learned?" and "Where are we going?" Looking at our work from a broader perspective can help us avoid repeating endless variations on studies that lead nowhere, or the unfruitful separation of research and practice.

Pearson's analysis has many specific virtues as well. He points out the major inconsistency between factor analytic studies which have failed to uncover significant independent reading subskills and the scope and sequence charts for teaching reading that assume such skills exist. Pearson also does a good job of integrating theoretical and practical issues. This is especially evident in the discussions of comprehension instruction and improving texts. He also makes a good case for the importance of looking at the process of change in schools, suggesting the ingredients that are essential for bringing about change.

All of these ideas are blended together into a reasonable and coherent view of what reading research has been, is, and should be. This view is from a rich perspective. It draws heavily not only from reading research but from the "cognitive science" triumvirate of linguistics, cognitive psychology, and artificial intelligence which has had an enormous influence on reading research over the last 15 years.

But revolutions seldom end with the raising of a new flag or the annointing of a new leader. Often, one set of changes only predisposes the system for a second phase. For example, in February, 1917, the Russians overthrew the Czar. Many then probably thought that was change enough. But the second revolution of 1917 (led by Lenin) was found to be even more

momentous than the first. Today it is easier to see the great changes underway early in 1917.

## Other Vantage Points

Despite its virtues, "The comprehension revolution" seems to me to suffer from two related weaknesses: The first is that its "future history" is only a logical continuation of current trends; the second is that the cognitive science perspective (one Pearson and I share) may be too narrow. As a result, I suspect that in the year 2000 we will look back at the article and ask how it could have missed the precursors of the dominant trends in reading in the 1990's, much as today we understand better the meaning of the events in Russia in February, 1917.

Now, what are these precursors? If I thought I knew I might be foolish enough to go out on my own limb and make predictions that would just as surely look shortsighted fifteen years from now. Fortunately, my role as critic saves me from such embarrassment. Instead, I will just suggest here some areas in which lurk gremlins who might upset Pearson's carefully constructed analyses and predictions. None of these would negate his points but they might cause him to relabel his paper: "The first phase of the comprehension revolution."

### 1. Computers

One area that is overlooked in "The comprehension revolution" is the use of computers for teaching reading. There are now hundreds of computer programs in use designed to teach

reading and related language arts skills. Many of them may be worthless, but some may well revolutionize the teaching of reading (Collins, in press).

Moreover, computers can be research tools as well, gathering data on student progress and effects of textual variations. Already, computer assisted eye movement research is restructuring our notions of basic perceptual processes in reading. And, the computer metaphor and computer models may give us new fuel for theories of the reading process.

2. Literary Theory

One of the most exciting intellectual developments in recent years has been the resurgence of work on theories of literature and criticism. There has been, in particular, a major effort devoted to the reader's response (see Tompkins, 1980). This work has served to highlight the importance of the transaction (Rosenblatt, 1978) that occurs among reader, author and text, giving a more integrated way to analyze reading. Drawing insights from the rich philosophical tradition of hermeneutics (Hoy, 1982), it has also made the case that all reading involves interpretation, as well as literal comprehension. The process of interpretation is seen as integral to all understanding Studies of the interpretation process attempt to resolve the competing claims of author, reader, text, and historical and literary context as determiners of meaning. Thus they address questions fundamental to any analysis of the reading process.

3. Social Context

We often forget that reading occurs in a social context. Children read with others, to others or because others ask them to read. They observe reading and writing being done by other students, teachers, family and friends. We are just beginning to understand how these social interactions affect the course of reading development. One line of research derives from the work of Vygotsky (1978) who argues that effective social functioning comes before cognitive development. Another comes from ethnographic research (Green & Wallat, 1981), which studies classrooms as mini-cultures in order to understand how reading develops. Such work does not aim to replace the more cognitively oriented work discussed in "The comprehension revolution" such as schema theory, metacognition, text structure, etc., but rather to situate it--to understand how reading comprehension fits in a social setting.

4. Thinking Skills

"The comprehension revolution" mentions at several points relationships between thinking per se and reading comprehension. But these relationships may be deeper than most reading professionals would acknowledge, even today. Techniques for analogical reasoning, creativity, problem solving, and mathematical reasoning covered in texts such as Whimbey and Lockhead's (1980) are considered somewhat distant from issues of reading comprehension. Nevertheless, as we move to understand

how prior knowledge is used in reading, how the reading task affects comprehension, and how readers can control their own reading process we touch more and more on general thinking skills. We may well find that major breakthroughs will involve the integration of the reading domain with more general studies of learning and thinking skills.

5. Language Arts

Writing and its relation to reading, are touched upon in "The comprehension revolution," one point being that the reading process and the writing process are more parallel than has been thought. What is missing is a discussion of the functional use of both reading and writing in what is beginning to be called functional learning environments (Newman, 1984). The goal is to create environments in which children learn to use language more effectively (reading, writing, speaking, listening) because they need it to accomplish tasks which are of importance to them. (This was one of the goals of our work with a computer program called Quill--Bruce & Rubin, 1984). The theory is that in a functional learning environment, children are in a position to learn the functional significance of language use and specific language skills. Thus, they become better critical readers because they read the writing of others and need to respond appropriately.

## Conclusion

"The comprehension revolution" is an excellent presentation of one way to analyze recent reading research and practice. One should read it, though, not as a definitive characterization, but as a stimulus for thinking about what is important in reading. What the second phase of the revolution is to be something for all of us to decide.

## References

Bruce, B. & Rubin, A. (1984). The Quill writing project for Alaska: Final report (BBN Report No. 5789). Cambridge, MA: Bolt Beranek & Newman.

Collins, A. (in press). Teaching reading and writing with personal computers. To appear in J. Orasanu (Ed.), A decade of reading research: Implications for practice. Hillsdale, NJ: Erlbaum.

Durant, W. & A. (1967). Rousseau and revolution. New York: Simon & Schuster.

Green, J. L., & Wallat, C. (1981). Ethography and language in educational settings. Norwood, NJ: Ablex.

Hoy, D. C. (1982). The critical circle. Berkeley, CA: The University of California Press.

Newman, D. (1984). Functional environments for microcomputers in education (Tech. Rep. No. 25). New York: Bank Street College of Education.

Rosenblatt, L. (1978). The reader the text, the poem. Carbondale: The Southern Illinois University Press.

Tompkins, J. P. (Ed.) (1980). Reader-response criticism: From formalism to post-structuralism. Baltimore: The John Hopkins University Press.

Vygotsky, L. S. (1978). Mind in society. Cambridge, MA: Harvard University Press.

Whimbey, A., & Lockhead, J. (1980). Problem solving and comprehension: A short course in analytical reasoning. Philadelphia: The Franklin Institute Press.